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LASER-INDUCED FLUORESCENCE SPECTROSCOPY OF TWO RUTHENIUM-BEARING MOLECULES: RuF AND RuCl

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This work extends the electronic spectroscopy of RuF, and reports on what we believe is the first observation of RuCl. Both molecules have been created in a laser-ablation molecular beam apparatus at UNB, and their spectra have been detected by laser-induced fluorescence. In the low-resolution survey of RuF from 400 to 770 nm, five bands were detected in the blue, green and infrared regions of the electromagnetic spectrum. Four of them were rotationally analyzed from high-resolution data. The three bands in the green region are associated with the $^4\Gamma_{11/2} - X^4\Phi_{9/2}$ system first observed by Steimle et al.[a] A new $^4\Delta_{7/2} - X^4\Phi_{9/2}$ transition in the blue region was also detected. Two high-resolution bands of RuCl were rotationally analyzed, and the ground state was also found to be $X^4\Phi_{9/2}$. The data provide detailed structural information about the molecules, such as bond lengths, vibrational frequencies, isotopic structure, spin-orbit interactions and hyperfine interactions.

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[a] T. C. Steimle, W. Virgo and T. Ma, J. Chem. Phys. **124** 024309 (2006).